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AUTHOR Hauck, LaVerne S., Jr.
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ABSTRACT

The Information Mapping technique was used to present a learning packet, and its usefulness in helping right-brain cerebrally dominant students to achieve the same level of subject mastery as their left-brain counterparts was examined. Reading level, grade point average, and gender were also analyzed. Torrance's "Your Style of Learning and Thinking" (SOLAT) was used to categorize cerebral dominance as left; right; integrated (both hemispheres used simultaneously; or mixed (one or the other hemisphere used as needed). Subjects were 199 male and female eighth grade students in a high school industrial arts class. The learning packet used the information mapping strategy, providing visual organization and functioning as an advance organizer. A 30-item multiple choice posttest assessed learning. Results indicated a significant difference between hemispheric dominance and test scores; subjects with an integrated style scored higher than left dominant students. Integrated or right style students had a higher reading level than left style students. There was no gender difference in hemispheric dominance, but males scored higher on the test. High test scores, grades, or reading level predicted high scores on the other two measures. It was concluded that information mapping was a viable means of presenting information. A short bibliography is appended. (GDC)

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# DIFFERENCES IN INFORMATION MAPPING STRATEGIES IN LEFT AND RIGHT BRAIN LEARNERS

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By

Dr. LaVerne S. Hauck, Jr.

Assistant Professor
Industry and Technology
Millersville University
Millersville, PA 17551
(717) 872-3329

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DIFFERENCES IN INFORMATION MAPPING STRATEGIES
IN LEFT AND RIGHT BRAIN LEARNERS

"The United States has a commitment to educational equity in literacy acquisition for all members of its society; the government has made enormous allocations in financial aid to minorities" (Roueche, 1979, p. 17). One minority that seems to be overlooked is the right brain learner. Persons in this group do not exhibit physical differences, but they experience unique learning problems. Studies of lateral specialization of the cerebral hemispheres suggest that the left hemisphere processes language that is rational and analytical and dominates in verbal tasks such as speaking and decoding print. The right hemisphere excels in nonverbal tasks that are more intuitive, spatial, and holistic (Ornstein, 1978). Wheatley (cited in Roueche, 1979) stated that the right hemisphere "is more capable of synthetic and original thought than the left hemisphere" (p. 19).

A large body of cognitive-style research links cognitive style to school success (Ornstein, 1978; Roueche, 1979; Hart, 1983; Webb, 1983). The literature implied that education as it is practiced, is predominantly a left brain activity. Accordingly, students who are able to learn using this style, are at a definite academic advantage. There is evidence that a significant portion of the population exists that would be served by a different learning style or strategy. "Educators should study the emerging, and sometimes conflicting findings of the relative role that the cerebral hemispheres play in cognitive functioning and basic skill development" (Roueche, 1979, p. 23). Hart (1983) commented, "The brain is not going to change to fit the schools; the schools must change to fit the brain as we now know it to be" (p. 15).

Our educational system places great emphasis on verbal comprehension, retention, and recitation. The dictates of our modern technical society have left few alternatives. Students are subjected to vast amounts of increasingly complex information which is necessary for survival in our rapidly changing society. Toffler (1970) referred to this as the premature arrival of the future. In all this change and information revolution, the human brain has continued to evolve, but not at the same rate as technological change.

Research in the area of information processing has given insight to the complex process of learning. It has also identified a population which has difficulty coping with our present educational system. This population has always existed, but with the aid of technology, (EEG studies by Ornstein, 1978), theories are being presented to explain why some people learn differently. These people have recently been termed "right brain learners" and have often been labeled "learning disabled."

The learning of information, as it is presented in the schools is in the format that would normally give an advantage to the left brain learner. A learning technique known as Information Mapping (Horn, 1971) was designed to aid

the learning process by presenting information in a visually organized format. This visual technique is in contrast to the format of a paragraph written in prose. The objective of this style of writing was to present information in an organized and uniform array (Fields, 1981).

The purpose of this study was to determine if Information Mapping was a viable learning technique for the right brain learner, helping right brain learners to achieve the same level of subject mastery as their left brain counterparts. Other factors that were analyzed, in addition to hemispheric dominance, were reading level, grade point average, and gender.

A search of ERIC revealed the left/right brain dominance topic has become quite popular in the past ten years. Educators are being encouraged to utilize more right brain activities in their teaching, indicating that an integrated approach to learning is much more beneficial than a single sided approach (Edwards, 1979; Sinatra, 1979; Herr, 1981; Matthews, 1982; Stahl-Gemake, 1982; Yellin, 1982).

Information Mapping has been demonstrated to aid the learning process (Soyster, 1980; Jonassen, 1980; Skelly, 1982). The format of Information Mapped material provides the learner not only with visual organization but also may function as an "advance organizer" as defined by Ausubel (Jonassen, 1980). The "advance organizer" characteristic acts as a link between Information Mapping and right hemisphere learning. The most recent search of the literature has failed to produce any studies that relate the topics of right brain learners and Information Mapping.

The majority of literature related to brain research and hemispheric dominance makes reference to Dr. Roger Sperry of the California Technological Institute and his early studies with patients suffering from severe epilepsy. Dr. Sperry received the prestigious Nobel Prize for Medicine in 1981 for these efforts. He hypothesized that if the seizure could be confined to one half of the brain, the other half could carry on, enabling the person to take medication or summon assistance (Guckes and Elkins, 1981). The procedure that he decided upon, to reduce the seizures, was to sever the corpus callosum (the nerve fiber bundle connecting the two hemispheres) and thus isolate the "two" brains. The resulting knowledge was labeled as "split brain" research. It must be noted that much of the early "split brain" research was compiled from a small number of patients; however, there is a growing body of knowledge from accident victims of brain damage that gives credence to the "split brain" concept (Hill, 1981).

It has been known for some time that the left side of the brain receives sensations from and controls the right side of the body, and vice versa, although the reason for this crossover is still undiscovered (Guckes and Elkins, 1981). Recent research demonstrated that not only does this crossover effect occur, but each half of the brain provides its own specialized functions. Thus, damage to certain areas of the left brain results in the loss of speech, poor reading and deterioration in logical thinking. Damage to the right brain reduces the ability to recognize faces or deal with broad concepts and generalizations

(Ornstein, 1978). Stellern, Marlow, and Jacobs, (1983) cited clinical and laboratory evidence that the human cognitive functions depend predominantly on either the left or right hemisphere of the brain. Information that is to be processed is directed to specialized portions of the brain; these specialized portions, left or right hemisphere, now are thought to be dominant for that type of information.

In summary, this study was designed to determine if right brain learners could achieve the same degree of subject mastery as left brain learners, when the learning material was presented in an Information Mapped format.

The population for this study consisted of 441 students enrolled in the eighth grade of a comprehensive public secondary school. The sample consisted of 199 male and female students who were in industrial arts classes that were required of all eighth graders. Random selection was used to divide the eighth grade class between home economics and industrial arts.

The school district was chosen for two reasons: first because the ongoing industrial arts instruction was similar to the learning packet that was to be used in the study, and second, because of the willingness of the school's administration and faculty to participate in the study. The industrial arts curriculum was chosen because the Information Mapping learning packet that was used was based on fluid power and hydraulics. It was assumed that there would be no threat to face validity. The learning packet was explained to the students as a new unit for possible inclusion into the existing program. The industrial arts program at the junion high school was based on the Industrial Arts Curriculum Project (IACP) which was developed by The Ohio State University. This curriculum utilizes reading assignments from a text book and laboratory manual. The Information Mapping packet was compatible to this curriculum due to its individualized instruction and was not perceived as unusual by the students.

A random factorial design was used as the experimental design for this study. More specifically, a variation of Campbell and Stanley's (1963) Design 6 (The Posttest-Only) was used. The variation of this design takes into account that a specific control group was not used. Each student in the industrial arts classes was given the Your Style of Learning and Thinking (SOLAT) by Torrance. The sample was divided in accordance with the SOLAT results into four groups: Left, Right, Integrated, and Mixed. All students received the same treatment and learning test. The treatment was the learning packet that was prepared in the Information Mapping format and the learning test was a 30 question multiple-choice posttest.

It was the finding of this study that there was no significant difference between grade point average and hemispheric dominance. However, there was a significant difference between hemispheric dominance and reading level, and between hemispheric dominance and learning test scores. The subjects who exhibited an integrated or right style of information processing had significantly higher reading levels, and the subjects who exhibited an integrated style of information processing had significantly higher scores on the learning test than their left style counterparts.

It was noted that the subjects with higher reading levels tended to have higher scores on the learning test. It was also noted subjects with the higher reading levels tended to be right or integrated in their style of information processing. An alternative hypothesis might have been that reading level could have been used to predict hemispheric dominance. This hypothesis would have been rejected on the basis of findings that indicated reading level and hemispheric dominance are significantly correlated in relation to the learning test. These two variables were studied independently due to the lack of interaction.

It was the finding of this study that the subjects who demonstrated a left or right dominant style of information processing accounted for only 36% of the sample. This appears to be in contrast with the dichotomous idea that everyone has either a left brain or right brain orientation toward learning and thinking. The SOLAT provides four possible combinations of the two hemispheres: left dominant; right dominant; integrated, which utilizes both hemispheres simultaneously; and mixed, which uses either hemisphere depending on the situation. The other methods that can be used for determining hemispheric dominance, such as the Wada procedure, the Dichotic Listening test, or the Conjugate Lateral Eye Movements test, provide results limited only the left and right hemispheric orientation.

The following conclusions are drawn from the data. It is noted that generalizations are made within the framework of this study.

1. There was a significant difference between lateral dominance and the Information Mapping learning test. The difference was between the integrated and left style of information processing. Subjects with an integrated style scored significantly higher.

2. There was a significant difference between lateral dominance and reading level. Subjects who had an integrated or right style of information processing had a significantly higher reading level than the left style of information processing.

3. There was no significant difference between the gender of the student and the hemispheric dominance as determined by the SOLAT.

4. There was a significant difference between males and females in relation to the learning test scores. Males scored significantly higher than females.

5. There was a strong positive relationship between the grade point average, reading level, and learning test scores. Subjects who were high in one of these measures had a high probability of being high in the other two.

As a result of this investigation and review of the related literature, the following suggestions are offered for further research.

1. Information Mapping appears to be a viable means of presenting information for learning. The various forms of the Info-Map should be applied to a wide variety of curricula.

2. The relationship between the classifications of the SOLAT and various age groups could be studied, or the same persons could be studied at various ages of development.

3. The relationship between the SOLAT and other tests of lateral dominance such as the Dichotic Listening test and the Conjugate Lateral Eye Movements test should be contrasted to reveal similarities and differences.

4. This experimental procedure could be replicated using learning material that was not gender-specific.

5. This experimental procedure could be replicated using a learning test that does not rely as heavily on reading level. A learning test could be developed that would use symbols might be an alternative.

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